

R E M A R K S

Claims 12, 14 to 17 and 21 to 35 as set forth in Appendix I of this paper are now pending in this case. Claims 13 and 18 to 20 have been canceled, Claims 12 and 27 have been amended, and Claims 28 to 35 have been added, as indicated in the listing of the claims.

Accordingly, applicant has specified the average molecular weight referenced in Claims 12 and 27 as a number average molecular weight,²⁾ and has replaced the expression "obtainable" in Claim 27 by "obtained." Additionally, applicant has introduced the provisions of Claim 18 into Claims 12 and 27. New Claims 28 to 33 have been added to further bring out some of the embodiments of the subject matter defined in Claim 27. The new Claims otherwise fully correspond to Claims 14 to 17, 22 and 23. New Claims 34 and 35 have been added to further bring out the embodiments of Claims 12 and 15 wherein the vinylidene group content of the polyisobutenes is more than 90%.³⁾ No new matter has been added.

The Examiner rejected Claims 12 to 27 under 35 U.S.C. §112, ¶2, as being indefinite, on the one hand, for failing to specify the type of average molecular weight referenced in Claims 12 and 27 and, on the other hand, for reciting the expression "obtainable." The respective issues have been obviated by applicant's amendment and withdrawal of the Examiner's respective rejection is therefore respectfully solicited.

Further, the Examiner rejected Claims 12 to 27 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of **Rath (US 5,408,018)**. The Examiner asserted in this context in particular that the reference described procedures in Examples 6, 7 and 8 in which

- (1) the molar ratio of alcohol to ether, and
 - (2) the molar ratio of the sum of alcohol and ether to Lewis acid,
- were in the ranges set forth in applicant's claims.

Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is respectfully solicited in light of the claim revisions which were effected by applicant, the arguments previously presented by applicant,⁴⁾ and the following remarks.

2) Cf. e.g. page 13, indicated line 34, of the application.

3) Cf. e.g. page 12, indicated lines 24 to 29, of the application.

4) Applicant's paper dated June 26, 2006.

The procedure which is illustrated by **Rath** in Example 6 employed, in sum:⁵⁾

26 mmol of boron trifluoride;

21 mmol of 2-butyl tert-butyl ether, and

10 mmol of 2-butanol.

In accordance with this illustration, the molar ratio (1) in which the alcohol and the ether were employed was, therefore, (10 : 21) 0.48, and the molar ratio (2) of the sum of alcohol and ether to Lewis acid was [(21 + 10) : 26] 1.19. Especially the latter value clearly fails to meet applicant's requirement that the molar ratio of the sum of alcohol (a) and ether (b) to boron trifluoride be from 1.4:1 to 2:1.

The procedure which is illustrated by **Rath** in Example 7 employed, in sum:⁶⁾

27.5 mmol of boron trifluoride;

4 mmol of 2-butyl tert-butyl ether, and

25 mmol of 2-butanol.

Here, the molar ratio (1) in which the alcohol and the ether were employed was, accordingly, (25 : 4) 6.25, and the molar ratio (2) of the sum of alcohol and ether to Lewis acid was, accordingly, [(4 + 25) : 27.5] 1.05. Neither one of these values meets the requirements which are recited in applicant's claims.

The procedure which is illustrated in Example 8 of **Rath** employs the same amounts of alcohol, ether and boron trifluoride as Example 6,⁷⁾ with the difference that Example 8 employs di-n-butyl ether instead of 2-butyl tert-butyl ether. Notably, the conversion of isobutene was a mere 76% in Example 8 whereas the isobutene conversion in Example 6 amounted to 85%, and the content of terminal double bonds in Example 8 was a mere 80% whereas 92% of terminal double bonds were obtained in Example 6 of the reference. The respective examples of the reference, therefore, illustrate convincingly why **Rath** emphasize that the ether which is employed in the procedure has to have at least one tertiary alkyl group.

Applicant's invention pertains to a process for preparing polyisobutenes having a terminal vinylidene content of more than 80% and

5) Cf. col. 13, indicated lines 16 to 19, of **US 5,408,018**.

6) Cf. col. 13, indicated lines 30 to 33, of **US 5,408,018**.

7) Cf. col. 40 to 42, of **US 5,408,018**,

or even more than 90%, and to the products obtained in that process, which inter alia requires that isobutene be polymerized in the presence of a complex comprising boron trifluoride and

- a) a primary alcohol having 1-20 carbon atoms or a secondary alcohol having 3-20 carbon atoms, or a mixture of these alcohols, and
- b) an ether containing no tertiary alkyl groups and having the formula I



wherein R^1 is a secondary alkyl group having 3-10 carbon atoms, and R^2 is methyl, ethyl, or a primary or secondary alkyl group having 3-10 carbon atoms.

Applicant's invention further requires

- (1) that the alcohol (a) and the ether (b) be employed in a molar ratio of from 0.01:1 to 1:1, and
- (2) that the molar ratio of the sum of alcohol (a) and ether (b) to boron trifluoride be from 1.4:1 to 2:1.

It is respectfully urged that the teaching of **Rath** contains nothing which could reasonably be taken to render applicant's invention as a whole prima facie obvious within the meaning of Section 103(a). In fact, the foregoing shows that the reference, when considered as a whole for what it reasonably taught to a person of ordinary skill at the time at which applicant made his invention, conveys that the utilization of ethers having at least one tertiary alkyl group is mandatory in order to arrive at polyisobutenes having a terminal vinylidene group content of more than 80%. It is well settled that the invention as a whole which is referenced in 35 U.S.C. 103(a) is not limited to the elements of features which are recited in a claim but also encompasses the properties which are achieved due to the particular combination of elements defined in the claim.⁸⁾ Since **Rath** illustrate that the use of ethers which lack a tertiary alkyl group results in a significant deterioration of the success in forming terminal vinylidene groups in the polyisobutenes a person of ordinary skill in the art could not reasonably expect that a process which does not employ the tertiary ethers of **Rath** would yield in the highly reactive polyisobutenes referenced in applicants' claims.

Also, in order to establish a *prima facie* case of obviousness three basic criteria have to be met:

8) *In re Antonie*, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977).

- (1) There must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference, ie. the motivation to modify the prior art must flow from some teaching in the art that suggests the desirability or incentive to make the modification needed to arrive at the claimed invention,⁹⁾
- (2) there must be a reasonable expectation of success, and
- (3) the prior art reference must teach or suggest all of the claim limitations.

Additionally, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and cannot be based on the applicant's disclosure.¹⁰⁾

The foregoing remarks show that the reasonable expectation of success is lacking so that the second of the three basic criteria for establishing a prima facie case of obviousness is not met. For essentially the same reason, the reference lacks the requisite suggestion or motivation to do what the applicant has done. The fact that two of the three basic criteria for establishing a prima facie case of obviousness are not met corroborates that the subject matter of applicant's claims cannot be deemed to be unpatentable under Section 103(a) in light of the teaching of **Rath**. It is therefore respectfully requested that the rejection be withdrawn. Favorable action is solicited.

The subject matter of applicant's Claims 12, 14 to 19 and 21 to 35 is, for the reasons set forth above, deemed to be patentable and the application should be in condition for allowance. Early action by the Examiner would be greatly appreciated by applicants.

9) Cf. *In re Napier*, 55 F.3d, 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995): "Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination."; *In re Geiger*, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); *In re Laskowski*, 871 F.2d 115, 117, 10 USPQ2d 1397, 1399 (Fed. Cir. 1989): "[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification", quoting *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)

10) *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).